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ABSTRACT

This statement of principles embodies a general approach to the nature and objectives of preservation and conservation work relating to library materials. It does not aim to provide a comprehensive list of detailed methods and practices, but is intended to establish a responsible attitude toward preservation and conservation by librarians. The document is divided into five major sections. The introduction includes discussions of aims and definitions, objectives, functions of libraries, library policies, problem assessment, selectivity, links with other libraries and library functions, implications of preservation policies, training, and cooperation. The second section, Preservation, considers factors related to storage and accommodation, temperature and humidity, light, air pollution, dust and cleanliness, storage materials and equipment, buildings, and standards employed. The section on the Security of the Collections includes discussions of fire, water, war and natural disaster, theft, and disaster preparedness. A section on Use of the Collections includes discussions of document protection and storage, library materials in transit, readers and reader facilities, copying, reprography policy, exhibitions, limiting use, and substitutes. The final section, Factors Affecting Deterioration, includes discussions of biological factors; micro-organisms; insects and other pests; chemical factors; and damage to paper, leather and parchment, photographic film, and nitrate film. (THC)

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International Federation of Library Associations and Institutions

J.M. Dureau and D.W.G. Clements

PRINCIPLES FOR THE PRESERVATION AND CONSERVATION OF LIBRARY MATERIALS

IFLA PROFESSIONAL REPORTS 8

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International Federation of Library Associations and Institutions

IFLA Professional Reports, No. 8

PRINCIPLES FOR THE PRESERVATION AND CONSERVATION OF LIBRARY MATERIALS

By

J.M. Dureau and D.W.G. Clements

IFLA Section on Conservation

IFLA Headquarters, The Hague, 1986

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PRINCIPLES FOR THE PRESERVATION AND CONSERVATION OF LIBRARY MATERIALS

INTRODUCTION

Background

1. The first statement of principles was published in the IFLA Journal, 5 (1979), 292-300. Following comment the Standing Committee on conservation was charged with the revision and expansion of the principles. This version presents a revised text, taking account of the many comments and contributions received, for publication and distribution.

2. IFLA intends to produce further revisions as and when appropriate and to publish them.

Aims and definitions

3. This statement of principles embodies a general approach to the nature and objectives of preservation and conservation work relating to library materials. It does not aim to provide a comprehensive list of detailed methods and practices, but is intended to establish a responsible attitude to preservation and conservation in librarians and libraries. Dangers to collections are often known but librarians and curators frequently do not proclaim sufficiently loudly the consequences of neglect. The principles are designed to encourage those responsible to face up to these consequences and, together with their scientific and technical experts, formulate a positive policy for the future of the materials in their collections.

4. The statement therefore sets out for the guidance of librarians a concise exposition of the principles of preservation and conservation applied to library materials.

5. In this statement the words 'preservation', 'conservation' and 'restoration' often occurs and are defined as follows :-

Preservation	Includes all the managerial and financial considerations including storage and accommodation provisions, staffing levels, policies, techniques and methods involved in preserving library and archive materials and the information contained in them.
Conservation	Denotes those specific policies and practices involved in protecting library and archive materials from deterioration, damage and decay, including the methods and techniques devised by technical staff.
Restoration	Denotes those techniques and judgements used by technical staff engaged in the making good of library and archive materials damaged by time, use or other factors.

Objectives of preservation

6. The objectives of preservation policies in relation to library materials may be defined as :-

a) to preserve the intellectual content of the information recorded by transfer to other media.
and/or

b) to preserve the original physical form of library and archive material in as intact and useable a form as possible.

Not every library can, or will want to, preserve every item in its collection in its original form, and the establishing of policy priorities is a necessary prerequisite for any library undertaking such work.

Functions of libraries

7. The purpose and function of a library is to collect, organise, preserve and make accessible materials in various formats (not only books and manuscripts, but also cine film, photographs, prints, maps, recorded sound and visual tapes and discs, etc.) all of which have in common the ability to carry and record human knowledge and thought. These items with their differences of date, civilisation and format are the expression of the intellectual

and cultural life of a given time and place.

8. Since not all libraries have the function of preserving their collections in perpetuity(some being only concerned with making recorded knowledge available in its current form) there exist various levels and degrees of concern for and involvement with preservation.

Library policies

9. Each library, having established its aims and objectives will need to define if, and to what extent, it will acquire material and retain items added to the collections. These policy decisions have implications for financial planning.

10. The initial policy decision is taken in selection; deciding whether or not to add an item to the collections. The next policy decision involves the length of time for which it is intended to keep these items and is one that needs to be taken with full awareness of the consequences. To keep library materials for as long as possible involves considerable financial expenditure on accommodation, special storage conditions and, in due course, conservation or repair.

11. There can be no general guidance for libraries on what material should be selected for acquisition and future preservation; this will depend on each individual library and its policy. However material not selected for addition to a library's collections may well not survive for future generations.

12. Libraries have the option not only of providing conservation treatment to the original, but can preserve the information content of a given item in another format (e.g. microfilm, optical discs, anastatic reprinting etc.), may preserve the original by withdrawing it from public use, or may defer treatment by utilising some protective measure such as boxing or providing slip cases.

Assessing the scale of the problem

13. One of the first stages is to evaluate the number of documents in need of treatment in order to provide factual evidence. This needs to be tackled by conservation surveys based on random sampling methods to estimate the condition of the paper, whether the bindings need repair, the date of publication of the items and other factors such as country of publication, acidity of the paper, etc., in order to estimate the broad types of treatment required and the quantities involved. From this estimates can be prepared of the level of resources required to meet these needs.

Selectivity

14. Both because of limited resources and the scale of the problem it is impossible to keep all documents in their original format or even by transfer of the intellectual content to other media. It is therefore necessary to be selective in deciding what is to be conserved, substituted or boxed and to decide on priorities. Such selectivity needs to be an explicit part of a library's policy if the organisation's responsibilities towards future users are to be properly undertaken and requires the acceptance of the implications of preservation policies at the most senior level in the library.

Links with other library functions

15. All these points indicate that when a library decides its preservation policies for its collections, decisions must take into account :-

a) links with the acquisitions and collecting policy as for example when deciding to purchase additional copies for conservation purposes, to buy microform copies, or to weed out and dispose of selected titles.

b) links with cataloguing and record creating activities which will enable users to be directed to surrogates rather than originals or provide a union list of items available in microfilm.

c) links with storage and accommodation policies as for example to ensure good quality accommodation

is provided and storage equipment is suitable;

d) links with public service policies and practices such as for example restrictions on use of originals, limitations on photocopying, or training in ways to handle books;
and

e) links with exhibition programmes to ensure items will not be damaged, such as undertaking any necessary repairs, providing adequate support for its physical display and ensuring proper environmental conditions.

Consideration must also be taken of scientific and technical advice as well as preservation and conservation policies and techniques. All these will have cost and financial implications.

Links with other libraries

16. In view of the necessity to preserve library collections for future generations of users it is essential that libraries work together on preservation policies at both national and international levels. It is necessary to emphasise that such national and international policies need to be applied not only to older library materials but also to those being produced today.

17. National library associations and national libraries have a responsibility for formulating national policies and promoting their acceptance. IFLA has a responsibility to encourage the acceptance and diffusion of professional principles of preservation and conservation administration through its channels.

Implications of preservation policies

18. It is not simply sufficient for librarians to be aware of their responsibility for the preservation of their collections, although awareness is the first necessity. This awareness should lead to positive initiatives for preserving and maintaining library collections, including provision for technical preservation and conservation processes. These principles include general information relating to such processes, although it is no simple matter to formulate preventive and curative measures to ensure the survival of the library materials for the future, and care

must always be taken to consider new methods, materials and processes arising from scientific and technical innovation.

Training

19. In order fully to understand preservation and conservation problems, any librarian responsible for these tasks should not only have some knowledge of the scientific bases and the techniques and materials involved, but also some feeling for the origin and history of the library materials in the collections, their physical composition as well as the information content. It is essential that librarians and conservators should recognise that in dealing with books as physical objects arising from various historical cultures, traditions and technologies, preservation and conservation should, as far as possible, be carried out in ways sympathetic to the originals. Librarians specially concerned with preservation should have training in these methods, but all students of librarianship should be acquainted with the importance of preservation within the library's overall function and policy.

Co-operation

20. Many types of library materials will be of equal interest to archivists. For this reason librarians should work in close co-operation with archivists, both nationally and regionally, in dealing with preservation policies and with practical technical problems.

21. The responsibility for preserving or conserving library materials rests on the librarian, but the implementation of technical methods of preservation and conservation rests with scientists and conservators. It is therefore essential that librarians, scientists and conservators co-operate closely and decide jointly on methods of treatment, materials to be used, and techniques in dealing with specific items. Processes or methods of treatment should be performed under the control of or with the advice of appropriate technical experts.

22. Technical and scientific advances in preservation and conservation processes are not always immediately useable in libraries and may be the subject of controversy. National libraries should test and validate new methods for their country and should, wherever possible, publish the results.

PRESERVATION

Storage and accommodation of library materials

23. Library materials consist primarily of organic matter and are therefore inherently perishable. The process of decay can however be slowed down considerably by creating favourable storage conditions. Provision should take account of :-

a) the general level of ambient air pollution,

b) the possibility of creating a controlled climatic environment

c) the cleanliness of storage accommodation; and

d) appropriate storage materials and equipment

24. The climatic factors of temperature, humidity, light and atmospheric pollutants including dust all cause degradation reactions. The chemical nature of these reactions may vary for different materials, but the following general principles apply.

Temperature and humidity

25. The temperature and relative humidity conditions during the long-term storage of library materials are known to have a significant and lasting impact on their preservation. Therefore, both of these variables, which are interdependent, need to be at a satisfactory level in storage and reading areas. There is extensive scientific evidence to suggest that the lower the storage temperature and relative humidity, the longer paper artefacts will retain their physical .. strength and appearance. Growth of biological pests is also increasingly inhibited as temperature and relative humidity levels are reduced. On the other hand, some library materials, such as leather and parchment, may suffer an irreversible loss of their natural resilience and flexibility, and possibly undergo dimensional changes if stored at very low levels of humidity. It is also necessary to avoid too wide a divergence between conditions in storage areas and reading rooms. Human comfort must be an additional consideration both in regard to readers and the staff working in the storage areas. A suitable compromise for conditions in storage areas can generally be found in the temperature range of 16°C to 21°C and a relative humidity between 40 and 60 per cent. Environmental conditions in all areas should be adequately monitored with reliable and regularly maintained hygrothermographic recording equipment.

26. Long - term stability of temperature and humidity conditions is another important consideration. Large and frequent fluctuations in environmental conditions should be avoided. Any changes in the environmental conditions within the range of temperature and humidity levels suggested above, should be small and gradual. This need for stability emphasises the seriousness of any failure in air conditioning systems. Fluctuations in humidity may lead to dimensional changes in some library materials. These changes can introduce stresses that may lead to cracks and/or distortions.

27. The environmental conditions suggested here for the long-term storage of library materials should be viewed as desirable though not inflexible goals. Environmental conditions that a library is able to attain in practice must inevitably be limited by the local climate as well as available economic and technical resources. It should be noted that some special library materials, for example, cine film and magnetic recordings require appreciably lower storage temperatures and relative humidity levels and appropriate advice should be sought.

28. In many places air conditioning systems may not be able to be provided or may have to be restricted to rare book collections (or to the archival master microfilm negatives) and simpler measures may be of use in limiting the extremes of temperature and humidity such as the following :-

a) ensure good air circulation by appropriate use of fans and windows
b) use of dehumidifiers to reduce humidity in badly affected areas of book stacks
c) use of insulation methods to reduce heat gain and use of blinds to keep out direct sunlight
d) ensure buildings are properly maintained to keep out dampness during rainy periods

Light

29. Light is energy. All wavelengths of light promote the chemical decomposition of organic materials, and higher energy ultraviolet (UV) light is the most harmful. Light levels must therefore be kept as

low as practical in storage, reading and display areas. The effect of light is cumulative. For this reason, the number of lux hours of light exposure per year on a specific material must be carefully controlled. Fluorescent light tubes should be fitted with UV filter sleeves. Ideally, storage facilities should be dark. However, if windows are present they should be covered with UV filters and provision made for blinds or shades to reduce light levels and heat gain. In reading rooms for rare and precious materials, the light level falling on library materials should be as low as practical for proper viewing with all sunlight excluded while fluorescent tubes and windows should be UV filtered. In exhibition situations, the light level falling on the surface of library materials must be kept low, not more than 50 lux is often recommended. However, the total exposure to light over the period during which an item is on exhibition is of importance. Library materials with sensitive design material (such as watercolours and fugitive dyes) should not accumulate more than 50,000 lux hours per year. Higher or lower levels of lux hours of exposure may be needed for other materials. Data on which to base additional specific recommendations are being collected and will be reported when available. Lighting levels and the UV content of the light in all areas containing library materials should be measured by a standard photometer and UV monitors. Any light source with a UV content above 75 microwatts (μW) per lumen requires UV filtration.

Air pollution

30. Air pollution is to a large extent associated with towns and industry and is a cause of damage to paper and other organic materials. Air pollutants vary hugely in size from gaseous pollutants to larger particles that are described as dust. Gaseous pollution is caused overwhelmingly by the burning of fuels and include acidic pollutants such as sulphur dioxide and oxidative pollutants such as ozone. They can only be controlled by air filtration as part of full ducted air conditioning. In areas of heavy pollution such full air conditioning may be needed.

Dust and cleanliness

31. The larger airborne particles are described as dust and apart from the

physical damage that can result from dust, it will also contain gaseous pollutants from the air that leads to acidity in the paper. The need for cleanliness and dust removal facilities are essential though again total control necessitates full ducted air conditioning systems. Much can be done to reduce problems of dust if full air conditioning cannot be provided by making sure all doors and windows fit firmly, use of sealing strips round doors, windows, etc., using hinged rather than sliding windows as the latter are never dustproof, etc.

32. To ensure the protection of the collections against dust a regular and sustained programme of cleaning should be maintained, undertaken with care and under supervision. Cleaning the floors of storage accommodation and book stacks may be left to non-specialised staff under instructions to respect the collections and not to touch library materials or shelves. Library materials on the shelves should only be cleaned by properly trained and instructed members of library staff. The cleaning programme should also include examination of collections to provide early warning of biological or chemical damage.

Storage materials and equipment

33. Storage materials and equipment used to house and accommodate library collections must be appropriate for those collections to accommodate them in proper positions (e.g. upright, flat, suspended) and protect them from dust, distortion and mishandling. Moving library materials from storage accommodation to reading rooms should not involve damage to those or neighbouring materials. Even with appropriate equipment, damage may occur if library materials of different sizes are mixed. Use of cabinets in which to store rare books especially can be of value not only in helping to exclude dust but in helping to reduce fluctuations in humidity levels.

34. All these items of equipment within a library including mechanised book transport systems should be considered and designed so as to minimise any risk of damage to the collections. Shelving should not have sharp edges, book supports should not mutilate volumes if roughly shelves, book trollies for moving materials from storage to reading

areas should be cushioned or padded, reading desks and surfaces for consultation should not have projections or sharp edges, and reading stands should not injure volumes used on them. The lowest shelves should not be too close to the floor to avoid problems of flood water or the books being damaged when the floors are cleaned or washed by mops.

Buildings

35. Library buildings should be designed as far as possible to meet conservation requirements. These requirements affect many aspects of planning; design and orientation of buildings, building materials (which can under some circumstances be used to produce satisfactory internal climatic conditions in preference to mechanical air control systems), internal building and furbishing materials and materials used for furniture including shelving as well as lighting, both natural and artificial. Airborne contaminants are a source of damage to library materials, especially to leather and to ground wood paper and should be taken into account when considering air conditioning systems.

Standards employed

36. The librarian needs to be conscious of the implications of his preservation policies in all decisions taken affecting the library collections. It may well be that a deliberate decision is made in some libraries that their collections need to survive for only a relatively short period of use, while other libraries may decide that the entire collections must be given conditions in which they will survive for as long as possible. Many libraries will decide that a particular part of their collections should survive as long as possible and in such cases suitable conservation conditions may be provided by the establishment of a special department (e.g. rare book department, reserve, local collection). It may be unrealistic to aim for the best conservation conditions in all libraries and for all library materials. However, it is a major responsibility of librarians to be fully conscious of the damage that will result from conditions below these recommendations and in light of that knowledge, to establish priorities ensuring the required conservation environment is provided for the preservation of their library collections.

SECURITY OF THE COLLECTIONS

Background

37. The principal concern of security is preventive, including measures to deal with damage from fire, water, war, natural disaster and theft. Effective preservation planning to deal with these events begins with the incorporation of suitable requirements into the architectural and building specifications.

Fire

38. Fire is a major hazard and many precious collections in the past have been badly damaged or destroyed through fire. Adequate protection against fire begins with the architectural design and building of the library. Design features such as large open spaces and ornamental staircases which will act as chimneys for the spread of fire should be avoided. Adequate fire doors and fire breaks must be installed, and the spread of fire through ducting for electrical wiring and electrical services should be minimised by siting such services outside the storage accommodation for the library collections. Emergency exits for library staff and readers should not permit unauthorised access or access to the collections. Local and national laws will affect such planning.

39. Materials used, either in the building or equipment, of libraries should be non-flammable and should not give off toxic fumes or smoke which might harm readers or damage library materials.,

40. Fire detection devices and/or alarms should be installed and should be regularly maintained and checked. They should be audible to all members of staff and readers who should understand the alarm signals. There should be emergency power supplies to such systems in case fire damages the main electrical supply source.

41. Sources of fire within a library should be reduced as far as possible; but those present should be listed and regularly checked (e.g. electrical wiring, lighting and power connections, chemicals in workshops or laboratory accommodation, reprographic and/or photographic machinery, staff or public kitchen facilities).

42. Static and portable appliances for fighting a fire should be provided throughout the library and should be well marked and conveniently sited. Staff should be instructed regularly in their use and in other fire procedures. Such appliances should be tested and filled regularly and should preferably be of an appropriate kind (e.g. powder and not liquid or gaseous, to avoid damage to library collections). However, professional fire-fighting organisations should advise on the provision and nature of these appliances.

43. It may be impossible to prevent readers and members of library staff from smoking in the library building, although this should be strenuously discouraged. If smoking is allowed, smokers should be segregated in attractive accommodation with numerous and convenient ashtrays and other receptacles to deposit cigaretts butts. Smoking and non-smoking areas should be clearly signposted. Smoking should not be allowed in storage areas. Smoking areas should be regularly checked by staff during open and closed hours in case of any outbreak of fire.

44. In case of serious fire, staff should clearly understand the procedures and summon professional fire-fighters to the outbreak as quickly as possible and organise the evacuation of members of library staff and readers. Firefighting staff will need a map of the library. It will be prudent for large libraries to consult professional fire-fighting staff regularly so that they are familiar with the building and its problems.

Water

45. Water damage is often potentially more dangerous to libraries than damage from fire. It can arise from damage to pipes carrying main water or sewerage supplies, central heating or air conditioning connections, externally from water seepage up walls, blocked gutters, or through damage to roofs, glass windows, etc. Water damage also invariably results from efforts to fight any fires and can be more extensive than the damage directly caused by the fire. Many of these causes can be avoided by regular planned building maintenance and others avoided when preparing the architectural specification for a

new building (e.g. drainage sumps should not be located in storage areas).

46. When library materials have been damaged by water, the librarian has first to arrest the damage and then where possible repair it. To arrest damage by water can be done by air drying in the traditional manner, or by accelerated deep freezing. It is prudent for large libraries to identify convenient local commercial resources for this latter treatment. In any case the availability of de-humidifying equipment ought also to be identified. Special recovery treatments will be required for photographic and other special library materials that have been damaged by water and appropriate technical advice should be sought.

War and natural disaster

47. Either eventuality implies a catastrophe and circumstances difficult to foresee. However, the librarian should devise and clearly set out contingency plans against such disasters. Libraries situated in zones liable to suffer earthquakes need to plan architectural strengthening of their buildings and possible consequent damage through fire and/or water. Outbreak of war may necessitate planning for the removal of library collections to safer conditions.

Theft

48. Effective planning against theft begins with the design of the library building so as to minimise unauthorised access through doors, windows, mechanical services ducting, sewers, etc. Successful security at the perimeter of the library building will prevent many thefts. Within the building, unauthorised entry to sections of the library not open to readers must be secured by means of locks, physical checks of identity and other controls. Members of library staff must also be properly identified and, if necessary, carry security passes at all times. Readers in the library should also, where necessary, be properly identified and carry tickets authorising their entry into the library building and their entitlement to consult library materials. Record files for both readers and library staff must be strictly maintained up-to-date and in a secure location. Reading rooms need to be supervised, especially those used for the consultation of rare

and precious books. Library materials must be marked in such a way as to indicate the library's ownership or custodial standing. Readers should not be allowed to bring coats and bags into reading rooms and there should be a physical check at the library exits. Entrances and exits for readers should be as few as possible.

49. Librarians should consider the installation of fixed, permanent intruder or pressure alarms for use during the library's closed hours. For larger libraries in addition to these alarms there may be a need for regular controlled patrols by special security staff linked to local police officers.

50. Most major libraries provide for an annual system of checking the contents of the book stacks as a way of ensuring items have been correctly re-shelved and identifying any items that may have gone missing. Mis-shelving returned items is the commonest cause of apparently missing items but such stock checks also serve to identify possible cases of theft.

Disaster preparedness

51. To combat the possible effects of all these potential problems it is desirable to devise a set of emergency procedures to raise the alarm, summon emergency services, summon library staff, assess the extent of the damage, decide what steps should be taken to disperse or evacuate the books, organise a team of helpers to recover and sort the books and then to ensure the damaged books are treated by trained conservation staff. Such plans need to be studied in advance together with emergency communication arrangements, the preparation of approrpiate manuals and the training of staff so they know what steps need to be undertaken. Where possible security copies of major treasures in the collections should be made and deposited in a distant secure location.

USE OF THE COLLECTIONS

Background

52. Library materials are, of course, meant to be used, so it is the duty of the librarian; (a) to ensure that library materials are used in such a way that they are not damaged; and (b) to restrict the use of rare and precious materials to those who really have need for access to the originals. Very frequent usage of library materials poses dangers from repeated handling.

Protection of documents

53. It is equally the duty of the librarian to ensure that library materials in his care are protected against physical damage, both in storage, in use and in transit. Rare and precious library materials may need to be under separate and adequate supervision with the provision of separate reading rooms and secure storage facilities. Unbound books are very vulnerable to physical damage and can be protected where appropriate by boxing or some form of temporary cover. A good quality binding provides the best form of protection with sewing going through folded sections and care taken in regard to adhesives and materials used. Binding styles used need to take account of the costs involved, the expected life and the value of the documents themselves also taking account of the artefactual value of the original binding style itself.

54. Single sheet material is even more exposed to damage and needs some form of protection. If not bound in one form or another single sheet material should be stored in special storage systems placed inside a cover or box. Covers and boxes should not be overfilled nor should they contain sheets of widely differing sizes. Sheets should not be rolled or folded and care taken to avoid creases. Large documents (maps, drawings, prints, etc) should be stored in special storage equipment with shallow drawers to avoid mishandling.

55. Materials used for bindings, covers, boxes, etc., should all be of archival quality to ensure the materials themselves do not result in chemical damage to library materials. Paper and board, etc., should be acid-free with an initial pH of 7 or higher.

56. Many documents may be acquired with, or previously utilised, paper clips, staples,rubber bands, self-adhesive labels, pins, etc. Such items are generally harmful to the documents and should be removed wherever possible.

Storage

57. Library materials should be housed on suitable shelving or racking, each shelf being slightly larger than the items stored on them leaving

space for circulation of air. Shelf tops and supports should be designed so as not to cause damage to volumes. Covers and boxes containing single sheets should preferably be stored in cupboards and drawers provided with adequate circulation of air. Very large volumes should be stored horizontally but not more than 2 or 3 items on top of each other.

Library materials in transit

58. Careful attention must be paid to the methods library staff use to move books either by hand, trollies, or mechanical book transport systems. Procedures and machinery should be reviewed and regularly checked. Since library staff are the most frequent handlers of library materials it is important that all library staff receive training in the safest methods of handling and transporting all kinds of library materials and the preservation implications that can result from mishandling. Greater care is needed when documents are moved between buildings to ensure no damage arises. Guidelines for handling books could usefully be issued.

Readers and reader facilities

59. Library materials may be damaged in use in reading rooms through careless use by readers or by defective equipment. Readers should be warned and, if necessary, trained to use library materials properly. Ink and pens should not be allowed in reading rooms where the use of pencils should be obligatory. The use of mechanical aids (e.g. tape recorders, calculators, computers, etc) should be controlled by members of library staff. Readers in rare book departments using special materials should always be supervised and should be recommended to have clean hands and normal dress before using these materials. They may need special instruction in using these materials. Appropriate furniture should be provided in reading rooms to help avoid possible damage such as book stands or lecterns to support rare books, provision of extra-large tables for large material, etc.

Copying

60. There are particular risks in the photography and reprography of library materials and these operations should be properly controlled and supervised, taking adequately into account preservation problems.

During photography care is needed to avoid excessive light and heat; during reprography it is important that suitable machines should be used to avoid damage and reduce handling, particularly in copying a large number of pages from very large bound volumes. Special care is needed in handling bound volumes during copying to avoid undue pressure on the spine in an attempt to obtain a copy that includes text close to the sewing. If there is any risk of damage, volumes should not be photocopied, and another type of copy should be made or further photocopies made from a master copy.

61. When rare and precious library materials are copied, the librarian should always retain the master negative to facilitate the production of future copies, the making of a security copy for deposit elsewhere, and to avoid the necessity of photographing material again so preventing further damage. Photocopying of rare and precious material by standard flat-bed photocopying machines should be avoided to protect the originals.

Reprography policy

62. A policy to cover all forms of reprographic work should be prepared to ensure material is not unnecessarily copied, is not damaged, is not subjected to repeated copying over a period of time, that the processes used are safe and are undertaken by trained staff. Such a policy should cover such points as the following :-

a) who decides whether an item can be copied or not and at what point in the process is this decision taken

b) what copying process can be used for what type of material

c) will the process provide a master copy from which further duplicate copies can be provided or which can act as an archival master copy

d) what restrictions should be placed both on the documents that may not be copied and on the processes that may be used

e) who may make the copies

Exhibitions

63. Permanent exhibitions within the library involving the continual exhibition of certain selected items from the collections should be discouraged unless carried out under the strictest of conditions with due regard for the life of the object and the need to avoid any form of damage to a single page or illustration. In any exhibition, special attention should be paid to ; (a) the security of the exhibit; (b) the mounting of the exhibit and its physical display; and (c) the climatic environment within the display cases which should be regularly monitored by appropriate equipment inside the cases. It may be advisable to arrange for the pages of particular items to be turned at intervals to minimise damage or weakening individual pages or bindings.

64. Loans to other libraries for consultation or for exhibition purposes may entail risk or damage to valuable items in the collections. The librarian has a duty to see that such requests, if granted, should involve the borrower making adequate provisions for safe keeping. Items of special value should be protected against excessive wear and damage in transit and the lending library may require such items to be carried both ways by personal courier at the cost of the borrower. Such items also need to be adequately insured, again at the borrower's cost. The librarian needs to be satisfied that the conditions for exhibiting the item should be appropriate on conservation grounds, and also that the security arrangements for the exhibitions are dependable. Insurance or indemnity against damage or loss during the period of the exhibition is also necessary. Travelling exhibitions pose particular problems for conservation reasons and the likelihood of damage is multiplied.

Lighting use

65. There is an inherent conflict between the use of library materials and their preservation. This may lead the librarian to restrict the use of original library materials to those having a real need to use them and requiring others to use surrogate copies or facsimiles for frequent consultation especially of rare materials. Rare and fragile items should not be made available for inter-library loan. Substitutes should be provided in place of originals.

Substitutes

66. Apart from providing copies to restrict use of rare originals the use of substitutes serves a wider role of preserving the intellectual content of documents that are becoming fragile and cannot be conserved in the original format by other methods. Microfilm is the most widely used process for such substitution but other techniques may become available in due course such as optical disc technology.

67. Microfilm, photographic or anastatic copies may be prepared to replace fragile items or may be used to copy unique items and those of very special value to avoid repeated use of the original. (This also has the advantage of enabling the library to provide copies to distant users). Librarians should consider preparing at least three complete film copies of such items ; (1) the master negative copy which should be stored in controlled climatic conditions and only used to prepare further duplicate negatives; (2) a duplicate negative to be used for the preparation of further positive copies; and (3) a positive copy for consultation or security deposit elsewhere. All such copies must be produced to high technical standards if they are to last as archival masters. When small libraries possess such rare and precious items the making of such reprographic copies may well be regarded as a national responsibility, and national libraries should consider undertaking the work of recording in a master union catalogue the existence of all such reprographic master copies. The production of facsimile editions, often in partnership with commercial publishers, can serve the same purpose and recoup for the library some of its costs.

FACTORS AFFECTING THE DETERIORATION OF THE COLLECTION

Biological factors

68. Biological agents (fungi, insects, rodents, etc.) can cause serious and sometimes irreparable damage to library materials (and to the fittings of libraries). Apart from preventive measures to reduce risks of infection many chemicals can be used to kill the biological agents involved and care must be taken to ensure these do not damage the documents themselves and can be used safely. Some chemicals are extremely toxic to human beings and must only be used under strictly controlled conditions by trained staff. Any chemicals should only be

used after consultation with appropriate specialists.

Micro-organisms (mould etc)

69. Library materials consist principally of organic materials that are vulnerable to attack by biological agents. Micro-organisms cause changes of colour in library materials (e.g. foxing) and sometimes cause them to become fragile. A very serious attack can destroy them entirely. The growth of micro-organisms is assisted by certain physical and chemical factors such as high temperature and humidity, overcrowded storage conditions, dust and poor air circulation. These physical and chemical factors need to be controlled to provide protection against attack. General guidance on climatic conditions is given in paragraphs 24-32 but specialist advice is often needed on optimal local conditions for preventing the growth of micro-organisms, and on the choice of suitable materials for conservation and restoration work in order to avoid materials vulnerable to attack by micro-organisms. If infection by micro-organisms occurs, assistance from a micro-biologist is needed to identify the organisms concerned, the factors leading to the outbreak, and to advise on measures required to combat and arrest the damage. Specialist advice must be obtained and strictly followed on the choice of a suitable disifectant and the mode of use (e.g. concentration, temperature, humidity and period of exposure) which will ensure not only that it is effective, but also harmless to the infected materials (paper, vellum, wood, leather, inks, colouring and some photographic materials).

Insects and other pests

70. Insects cause damage with well defined morphological characteristics not only in books but also in wood fittings and equipment in libraries. Insect infestation is assisted by the same climatic factors as described for micro-organisms and to prevent attack similar measures need to be adopted. If an attack occurs assistance must be sought from an entomologist as a matter of urgency to identify the species and advise on measures to combat and control the outbreak including the most effective insecticide. Additional specialist advice must also be sought and strictly followed to ensure that the treatment is harmless to the infested library materials and to members of library staff. Many countries have various traditional methods that are of use

in repelling insect attack. Properly used such traditional methods can help to significantly reduce the risk and should be employed and extended where possible and if necessary research could be undertaken to identify the traditional methods used in each country.

71. Infestation by other pests such as rats, mice and other small mammals can also cause damage to books and fittings and should be dealt with by properly trained pest officers. Care is especially required if poisoned bait is used.

Chemical factors

72. The advice of a professionally qualified conservator and/or chemist skilled in library conservation should always be sought before any treatment involving solvents or any other chemical is undertaken.

Damage to paper

73. The two main causes of chemical damage to paper are oxidation and the hydrolysis of cellulose. In library conservation it is not at present practical to take significant measures against oxidation, but a clear awareness of the nature of hydrolysis will provide guidance on the precautions to be taken against it. The hydrolysis of cellulose is its decomposition under exposure to water (including normal moisture in the air). Hydrolysis is catalysed by substances which are not themselves used up in the process; the most significant catalysts are acids of all kinds. Oxidation is catalysed by heavy metals (e.g. iron, copper). The higher the temperature the faster both oxidation and hydrolysis accelerate, approximately doubling with each 10° Celsius rise in temperature. Daily fluctuations in humidity and temperature may further increase the rate of degradation. The acids that catalyse the hydrolysis arise from various sources, above all from the degradation of lignin left in wood-pulp paper, from additives used in the production of paper such as alum used in sizing, by the conversion of atmospheric pollutants to strong acids, from other chemicals used in paper making processes and from various inks and colouring pigments.

74. To a large extent such acids can be removed by careful washing undertaken by trained conservators. The harder the water, i.e. the more

carbonate it contains the better but generally a deacidification agent such as calcium carbonate or magnesium bicarbonate needs to be added to neutralise all the acids and leave mildly alkaline reserve in the paper to act as a buffer against later acid attack. Any covers or folders of documents should contain a mildly alkaline buffer as a protective measure against acids. Older hand-made paper usually contains such a buffer (e.g. calcium carbonate) as a result of the method of production. Paper produced since about 1860 on the other hand is mainly produced from wood pulp and frequently contains the seeds of its own decay due to the presence of lignin and other chemicals and unless a deacidification process is applied these papers will embrittle and finally disintegrate.

75. If librarians can influence papermakers they should insist that paper for books should contain no ground wood, no more than traces of heavy metals such as iron and copper, be alkaline sized and should always contain calcium carbonate which, the evidence from older paper shows, when present in concentrations of 1-2% persists as an anti-acid buffering agent.

76. Experiments leading to the introduction of large scale deacidification processes are under way in Europe and North America; it is hoped that their successful conclusion will help to resolve the large scale problem of excess acidity in paper. If librarians undertake any deacidification treatment on a small scale, advice on the choice of materials and reagents should be sought from an experienced scientist or conservator.

Damage to leather or parchment

77. Chemical damage to leather is mainly the result of improper tanning and/or atmospheric pollution. Storage conditions significantly affect the rate of deterioration of leather and parchment. Deterioration of parchment is usually due to micro-biological attack and parchment is in general more resistant than leather to polluted atmosphere. When chemical damage occurs in parchment it is usually caused by very unfavourable storage conditions and by unsuitable inks, sizing or other added materials. Strict control of storage and climatic conditions is required for the conservation of leather and parchment,

since deterioration is essentially irreversible and there is little available in the way of effective restoration treatment. Some protection for leather against deterioration damage is achieved by regular and systematic treatment with a suitable dressing.

Damage to photographic film

78. Film is especially liable to chemical damage as well as physical damage. It must therefore be stored in appropriate containers of non-ferrous metal or other suitable material (e.g. polyester) that does not degrade and release any corrosive or oxidising substance, or any other pollutant, particularly those derived from sulphur. Where board or paper is used for such containers it should be neutral and free of ground wood and reducible sulphur. Only silver halide film has been shown to have a long life expectancy and librarians should insist on the highest standards of care in fixing, rinsing and processing film. It is essential that film should be stored in strictly controlled atmospheric conditions of low temperature and humidity with complete protection against air pollution and against light.

79. The recommenced archival storage conditions for triacetate and polyester based film are a temperature below 16°C and a relative humidity between 30% and 40%. Colour film is not really archival and needs to be stored at 0° C. These conditions together with air purification must be provided if the highest level of film conservation is to be achieved and are essential for master negatives or security copies of items of greatest value or unique importance. Film not stored in these optimum conditions will decay and will involve librarians in carrying out regular programmes of re-copying before physical or chemical damage becomes too extensive. Collections of damaged films and prints should always be copied without delay. The condition of films in storage should be checked regularly for signs of deterioration.

80. Still photographs, both negatives and prints, comprise of a range of materials and processes and it is essential to identify the process and materials employed in the production of any given photograph if problems in conservation are to be avoided. Specialist advice

should be sought on the storage and preservation of this range of material.

Nitrate film

81. Older nitrate based film stock needs to be stored separately at $2^{\circ}C \pm 2^{\circ}$ but gradually disintegrates and is potentially dangerous. Any such film should be duplicated on to modern safety base film and the original nitrate film destroyed. Even the best storage conditions can only retard the process of disintegration of nitrate film but cannot stop it. Nitrate film must never be stored with other library materials.

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